

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION  
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In the Matter of

Petition for Rulemaking to Allocate  
the 5.1 - 5.35 MHz Band and Adopt  
Service Rules for a Shared Unlicensed  
Personal Radio Network

RM-8648

Petition to Allocate Spectrum in the  
5 GHz Band to Establish a Wireless  
Component of the National  
Information Infrastructure

RM-8653

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COMMENTS

Constellation Communications, Inc. ("Constellation"), by its attorney, files these Comments in response to the petitions for rulemaking filed by Apple Computer, Inc. ("Apple") and Wireless Information Networks Forum ("WINForum") proposing the allocation of the 5 GHz band for unlicensed wireless data transmissions.

Constellation is an applicant for a low-Earth orbit ("LEO") satellite system in the 1610-1626.5 MHz and 2483.5-2500 MHz bands to the mobile-satellite service ("MSS").<sup>1</sup> This LEO MSS technology will provide important new services to the public and will stimulate technological and economic development both in this country and on a global basis.<sup>2</sup> In particular, LEO MSS systems such as Constellation's will provide basic telecommunications services in rural areas not served by any other media as well as advanced mobility services on

<sup>1</sup> See Application File Nos. 17-DSS-P-91(48) and CSS-91-013, as amended on November 16, 1994.

<sup>2</sup> See e.g., Constellation Comments in CC Docket No. 92-166 filed on May 5, 1994, at 5-12; Report and Order in CC Docket No. 92-166, FCC 94-261 released October 14, 1994, at paras. 3-5.

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a global basis.<sup>3</sup> The Constellation system is designed to utilize the 5000-5250 MHz band for its Earth-to-space feeder links.<sup>4</sup> This feeder link band is essential for the operations of Constellation's system, and the proposed wireless data transmission networks could cause harmful interference to Constellation's feeder link operations.

The basic technical problem raised by these petitions is that they do not present any technical parameters to define and limit the proposed operations, nor any convincing sharing analyses to demonstrate that harmful interference will not be caused to LEO MSS feeder links operating in the 5 GHz band.<sup>5</sup> In order to demonstrate compatibility, the petitioners must show that the aggregate power transmitted by all of the unlicensed wireless data transmitters within the LEO MSS satellite receiving beam can be limited to an acceptable value that does not significantly degrade the performance of the LEO MSS feeder link.

The only interference calculation provided is based on the use of Hiperlan parameters.<sup>6</sup> However, that calculation includes assumptions on a number of significant interference parameters, such as user activity factors ratio of indoor/outdoor users, and building attenuation,

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<sup>3</sup> The Commission has already recognized the benefits of this technology as part of the national Information Infrastructure.

<sup>4</sup> The 5 GHz band is necessary because Constellation's system design requires earth coverage satellite antenna beams to support access to the system by multiple feeder link earth stations using code division multiple access techniques. See Constellation Comments in CC Docket No. 92-166, supra note 3.

<sup>5</sup> Constellation assumes that no interference protection will be afforded to unlicensed wireless operations from licensed feeder link transmissions.

<sup>6</sup> See WINForum petition, Annex B, at 4-5. Apple simply cites conclusionary language from the CPM Report regarding sharing between Hiperlans and MSS feeder links, although it appears to concede that additional technical work is needed to develop an acceptable sharing scenario. See Apple Petition at 30-31.

which have not been shown to be representative of the unlicensed wireless data transmission networks envisioned by the petitioners.

In an uncontrolled environment, the interference into LEO MSS feeder links could be much more severe than the petitioners assert to be the case. For example, the following calculation shows that the aggregate of 50 million Hiperlan users each transmitting at -10 dBW have the potential to cause harmful interference to the satellite receiver in the Constellation 5 GHz feeder link.<sup>7</sup>

Elevation to satellite	90	5	degrees
EIRP/transmitter	-10	-10	dBW
Data rate	20	20	mbps
Total transmitters	50	50	million
Number of RF Channels	3	3	channels
Aggregate EIRP	62.2	62.2	dBW
Range to satellite	2,000	4,900	km
Free space path loss	172.5	180.2	dB
Satellite antenna gain	-2.0	3.0	dB
Received interference	-112.2	-115.0	dBW
Interference density (Io)	-185.2	-188.0	dBW/Hz
Sat Noise Temperature	525	525	K
Noise density (No)	-201.4	-201.4	dBW/Hz
Io/No	16.2	13.4	dB

The effects of this interference will be mitigated if the ratio of active to passive nodes and the ratio of indoor to outdoor nodes are small, and if significant building attenuation is provided for

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<sup>7</sup> Typically, the value of Io/No should be about -10 dB to insure that the effects of interference do not significantly degrade the LEO MSS feeder link performance, which would require the aggregate EIRP to be reduced by about 26 dB from the value indicated in the calculation.

in the great majority of cases. Such interference mitigation should be quantified in terms of a sharing criteria specified as an aggregate EIRP level not to be exceeded by the totality of unlicensed transmitters. However, even if such a limit were specified in the rules, the petitioners do not address the more fundamental technical problem with unlicensed operations that there is adequate control to insure that the aggregate EIRP limit is not exceeded by these systems operations. To make matters worse, Apple contemplates the use of unlicensed outdoor links with path lengths on the order of 10 km or more. Such operations could increase transmit powers (and thus interference) by factor of 25 dB or more.<sup>8</sup> Thus, before unlicensed operations can be permitted in this band, the Commission must require petitioners to make a convincing technical (or some other technical mechanism) showing that internal interference levels among the wireless transmission users will in fact limit the aggregate EIRP to a level that does not cause harmful interference to LEO MSS feeder link reception.

Because the petitioners do not provide specific technical rules or the technical characteristics of the transmitting equipment that would be eligible for unlicensed operations, it is not clear that the 5 GHz band is the most suitable one for the types of operations envisioned by the petitioners. Specific technical concepts and parameters are needed for full consideration of the proposed rulemaking petitions. For example, other bands that are potentially usable for unlicensed operations, particularly at 900 MHz, 1.8/1.9 GHz (PCS) band, 28 GHz and 40 GHz. Given these options, it is important that the petitioners provide a convincing analyses of why

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<sup>8</sup> For example, Apple's desire for links on the order of 10 to 15 km long have a much more significant interference potential compared to the 50 m cell radius assumed in the interference analysis. Such links are typical of licensed point-to-point fixed links, and Apple has not demonstrated why unlicensed operations are needed. This type of operation becomes even more problematic with the use of omni-directional antennas. See Apple Petition at 18.

5 GHz is needed.<sup>9</sup> The lack of technical specificity of the proposed network characteristics and operations do not provide a clear enough definition of requirements that permits an adequate review of which available bands are the most suitable for unlicensed, high data rate wireless data transmission networks.

In summary, Constellation opposes these petitions to the extent that they request the Commission to allocate any portion of the 5000-5350 MHz band for unlicensed wireless data transmissions. No specific technical regulations have been proposed and no convincing technical studies have been submitted to demonstrate that such operations are compatible with LEO MSS feeder links. In particular, technical studies are needed to determine appropriate power limits on wireless transmitters and the aggregate EIRP density needed to protect satellite uplinks, together with the technical means of ensuring that such limits will be complied with in practice if the facilities are unlicensed.

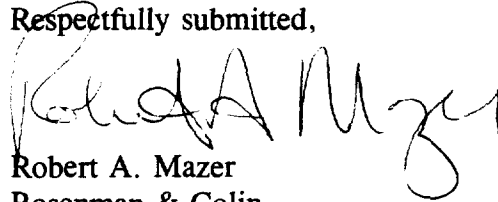
For the reasons stated above, Constellation urges the Commission to issue a Notice of Inquiry to collect information on the specific and operational characteristics of such unlicensed

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<sup>9</sup> In addition, infrared devices, which are unlicensed wireless devices that do not use the radio frequency spectrum are not in the market to connect computer devices over short distances.

transmitters, the appropriate bands for unlicensed wireless data transmissions, and possible sharing compatibility between LEO MSS feeder links and wireless data transmissions.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Robert A. Mazer", written over the typed name.

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July 10, 1995

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## **CERTIFICATE OF SERVICE**

I, Robert A. Mazer, do hereby certify that the foregoing "Comments" of Constellation Communications, Inc. was served by hand\* or first-class mail, postage pre-paid, this 10th day of July, 1995 on the following persons:

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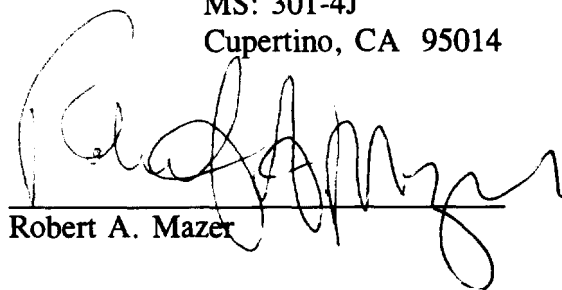
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